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Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/771,762 | BUER, KENNETH V. | |
| | Examiner | Art Unit | |
| | Lana Le | 2685 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *29 January 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-23* is/are rejected.

7)☒ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *29 January 2001* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. §§ 119 and 120**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *2*.
4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

## DETAILED ACTION

### *Claim Objections*

1. Claims 1, 11, 13-14, 22 and 24 are objected to because of the following informalities:

With regards to claim 1, line 8, the first word of sentence: "where" should be changed to "wherein".

With regards to claim 11, a semicolon should be used at the end of part a. instead of a comma.

With regards to claim 13 is objected as being dependent upon a latter claim 14 and claim 14 being dependent on claim 13, wherein no connection is made to which independent claim they depend on, and if it is a typo in that claim 13 should depend on claim 11 or 12, appropriate correction is required.

With regards to claim 14, since claim 3 states –a distributed element frequency selective junction--- wherein claim 14 states –a distributed frequency selective junction--, the word "element" should be added to claim 14 for consistency.

With regards to claim 22, there is a typo in line 6 in which "of" before "from" should be deleted.

With regards to claim 24 is objected to since it comes consecutively right after claim 22 and should be numbered as claim 23 since there are no further claim after that, the numbering of claims is not in accordance with 37 CFR 1.126 which requires the original numbering of the claims to be preserved throughout the prosecution. When

claims are canceled, the remaining claims must not be renumbered. When new claims are presented, they must be numbered consecutively beginning with the number next following the highest numbered claims previously presented (whether entered or not). Misnumbered claim 24 has been renumbered as 23.

Also, the original numbered claim 24 should depend on claim 22 and not 23 since there are no claim 23, and if renumbered to be claim 23, it would depend on itself, appropriate correction is required. Also, after "wherein" the word "the" is missing before ---method--- in the original numbered claim 24, line 1.

***Drawings***

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: reference numeral 240A of figure 2 and reference numeral 302C of figure 3. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified

and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Specification***

Applicant is reminded of the proper content of an abstract of the disclosure. A patent abstract is a concise statement of the technical disclosure of the patent and should include that which is new in the art to which the invention pertains. If the patent is of a basic nature, the entire technical disclosure may be new in the art, and the abstract should be directed to the entire disclosure. If the patent is in the nature of an improvement in an old apparatus, process, product, or composition, the abstract should include the technical disclosure of the improvement. In certain patents, particularly those for compounds and compositions, wherein the process for making and/or the use thereof are not obvious, the abstract should set forth a process for making and/or use thereof. If the new technical disclosure involves modifications or alternatives, the abstract should mention by way of example the preferred modification or alternative.

The abstract should not refer to purported merits or speculative applications of the invention and should not compare the invention with the prior art.

Where applicable, the abstract should include the following:

(1) if a machine or apparatus, its organization and operation;

(2) if an article, its method of making;

(3) if a chemical compound, its identity and use;

(4) if a mixture, its ingredients;

(5) if a process, the steps.

Extensive mechanical and design details of apparatus should not be given.

3. The last sentence of the abstract "Due to the accessibility....may be wider distributed and are made more readily available and at a lower cost" refer to the purported merits and is not really proper abstract content.

4. In the specification, page 10, line 6, a typo ---a the---- before ---anti-diode--- is stated. Appropriate correction is required.

***Information Disclosure Statement***

5. The information disclosure statement (IDS) received on 04/19/01 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1-5 and 11-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over the Dougherty et al (US 5,465,420) in view of the admitted prior art and further in view of Rizzi (Microwave Engineering Passive Circuits, copyright 1988).

Regarding claim 1, Dougherty et al disclose a mixer 10 (figs 1-2), the mixer capable of operating at microwave frequencies (col 1, lines 24-25) the mixer 10 comprising:

a) an RF source 14 (fig. 1) for providing an RF signal over transmission line 18 (col 3, lines 1-11; col 1, lines 20-25);

b) a local frequency oscillator 12 (LO source; fig. 1) for providing a local oscillator signal via transmission line 16 (col 3, lines 11-17);

c) a high frequency diplexer (a lumped element combiner 24 of figs. 1-2; col 4, lines 57-60 since in the specification on page 9, lines 14-20 applicant states that one of ordinary skill in the art will recognize that a diplexer maybe any configuration comprised of a lumped element combiner, etc. used for combining at least two input signals and producing an output signal (page 9, lines 14-20) in order to utilize any alternative arrangement of circuit arts/components/elements that results in an output signal representing a sum/addition of the input signals as in applicant's claimed invention in which a device operates merely by combining or summing two input signals), the diplexer (lumped element combiner 24) comprising:

at least a first diplexer input (combiner input port 22) for receiving an RF signal (over transmission line 18; col 3, lines 11-17), a second diplexer input (combiner input port 20) for receiving the local oscillator signal (over transmission line 16; col 3, lines 11-17),

and a diplexer output (combiner output port 26) for providing a combiner output signal substantially equal to the sum of the RF signal and the local oscillator signal (to be outputted to transmission line 30; figs. 1 & 2; col 3, lines 16-18; col 3, lines 44-45).

d) a downconverter 32, 38 for receiving the diplexer output signal, wherein the downconverter provides an intermediate frequency output (col 3, lines 41-57).

Dougherty et al didn't disclose: a k-band radio frequency signal and a low noise block downconverter comprising a low noise amplifier.

The admitted prior art further discloses a low noise block downconverter for use in a satellite broadcasting system receiver (page 2, lines 11-18; fig. 1), the low noise block downconverter comprising a first low noise amplifier 130 (fig. 1) for providing an amplified radio frequency signal (page 5, lines 13-14).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to put the mixer of Dougherty et al in a low noise block downconverter environment of the admitted prior art in order to downconvert higher frequency modulated carrier signals as suggested by the admitted prior art (see page 2, lines 11-12), i.e. for purposes of terrestrial reception of television signals having video information frequency modulated on a microwave band carrier emitted from a satellite, due to the mixer of Dougherty et al being particularly useful at microwave frequencies and therefore being capable of operating when it is used in a low noise block downconverter and to add the low noise amplifier of the low noise block downconverter of the admitted prior art before Dougherty et al's mixer in order to strengthen the

incoming signal with less noise and to provide gain and input and output impedance as is common in the art before inputting the RF signal to the mixer.

Dougherty et al and the admitted prior art didn't specifically disclose:

a k-band radio frequency signal. Rizzi discloses wherein a k-band (18-26 GHz) is contained within the microwave frequency band (1-40GHz) in the typical microwave frequency range (300 MHz –1000GHz). Since Dougherty et al disclose the mixer is useful at microwave frequencies (col 1, lines 24-25), it would have been obvious to one of ordinary skill in the art at the time the invention was made to have a k-band RF signal in Dougherty et al and the admitted prior art in order to operate the mixer at a desired frequency of interest so that downconverting of a specific k-band signal will allow a tuner within a satellite receiver to demodulate the corresponding audio and video signals.

Regarding claim 2, Dougherty et al, the admitted prior art, and Rizzi disclose a low noise block down-converter according to claim 1 wherein in the specification, page 9, lines 14-20, applicant states that one of ordinary skill in the art will recognize the diplexer may be comprised of a resistive combiner, or a distributed or other broad-band RF summing junction (page 9, lines 14-20 wherein the summing junction can be distributed or have other characteristic which can be resistive or wherein the resistive combiner is analogous to a resistive summing junction since a combiner also adds input signals and outputs a sum of the input signals). It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the lumped sum combiner of Dougherty et al with a resistive summing junction in order to use any type

of equivalent summing circuit which is capable of adding the input signals for impedance matching purposes and isolation between the input signals.

Regarding claim 3, Dougherty et al, the admitted prior art, and Rizzi disclose a low noise block downconverter according to claim 1, wherein in the specification, page 9, lines 14-20, applicant states that one of ordinary skill in the art will recognize the high frequency diplexer further comprises a distributed element frequency selective junction (page 9, lines 14-20; a distributed element junction with frequency selectivity). It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the lumped sum combiner of Dougherty et al with a distributed element frequency selective junction in order to sum N independent and distributed circuit elements at a particular frequency of interest to reduce noise occurring in electronic circuitry.

Regarding claim 4, Dougherty et al, the admitted prior art and Rizzi disclose a low noise block downconverter according to claim 1, wherein Dougherty et al disclose the diplexer comprises a lumped element junction (lumped element combiner 24; wherein by the dictionary definition a junction is a point of joining, wherein in the specification, page 9, lines 14-20, applicant states that one of ordinary skill in the art will recognize the lumped element junction/combiner can be frequency selective (page 9, lines 16-20). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have the lumped element junction/combiner be frequency selective in order to add only the desired frequencies.

Regarding claim 5, Dougherty et al, the admitted prior art and Rizzi disclose a low noise block downconverter according to claim 1 wherein the admitted prior art disclose the downconverter further comprises an integrated circuit chip 210 (fig. 2). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have the downconverter comprises an integrated circuit chip in order to have a compact and smaller sized overall receiver component device.

Regarding claim 11, Dougherty et al discloses a mixer 10 (the mixer type 10 being particularly useful or capable of operating at microwave frequencies; figs. 1& 2 and hereafter; col 1, lines 24-25; col 2, lines 62-64; col 4, lines 52-53) comprising:

a) a high frequency diplexer (a lumped element combiner 24; col 4, lines 59-60 wherein applicant states on page 9, lines 14-20 that one of ordinary skill in the art will recognize that a diplexer maybe any configuration comprised of a lumped element combiner, etc. used for combining at least two input signals and producing an output signal (page 9, lines 14-20) in order to utilize any alternative arrangement of circuit arts/components/ elements that results in an output signal representing a sum/addition of the input signals as in applicant's claimed invention in which a device operates merely by combining or summing two input signals) for providing a diplexer output signal (combiner output signal at output port 26; col 3, lines 16-21), the high frequency diplexer (lumped element combiner 24) having at least a first diplexer input (combiner input port 22) for receiving an RF signal (over transmission line 18; col 3, lines 11-17), a second diplexer input 22 (combiner input port 20) for receiving a local oscillator signal from LO source 12 (over transmission line 16; col 3, lines 11-17);

b) a local frequency oscillator 12 for providing the local oscillator signal over transmission line 16 to the second diplexer input port at 20 (fig. 1, col 3, lines 1-2; col 3, lines 11-17); and

c) a downconverter 32, 38 configured to downconvert the diplexer output signal (combiner output signal at output port 26) to provide an intermediate frequency output (col 3, lines 29-57).

Dougherty et al didn't disclose: the mixer receives a k-band RF signal, the mixer for use in a low noise block downconverter.

The admitted prior art further discloses a low noise block downconverter (page 2, lines 11-18; fig. 1). It would have been obvious to one of ordinary skill in the art at the time the invention was made to put the mixer of Dougherty et al in a low noise block downconverter environment for the intended use of downconverting higher frequency modulated carrier signals as suggested by the admitted prior art (see page 2, lines 11-12) for the purpose of, i.e. terrestrial reception of television signals having video information frequency modulated on a microwave band carrier emitted from a satellite, due to the mixer of Dougherty et al being particularly useful at microwave frequencies and therefore being capable of operating when it is used in a low noise block downconverter.

Dougherty et al and the admitted prior art didn't specifically disclose:

the mixer operates in k-band wherein the diplexer receives a k-band RF signal. Rizzi discloses wherein k-band (18-26 GHz) is contained within the commonly used microwave frequency bands (1-40Ghz) in the typical microwave frequency range (300

MHz –1000GHz). Since Dougherty et al disclose the mixer type 10 is not limited for use at any frequency range and particularly useful and operable at microwave frequencies (col 1, lines 24-25), it would have been obvious to one of ordinary skill in the art at the time the invention was made to allow the mixer of Dougherty et al to operate in the k-band wherein the combiner/diplexer receives a k-band RF signal in order to operate the mixer at the frequency of interest, so that downconverting of a specific k-band signal will allow a tuner within a satellite receiver to demodulate the corresponding broadcast audio and video signals.

Regarding claim 12, Dougherty et al, the admitted prior art, and Rizzi disclose a k-band mixer according to claim 11 wherein in the specification, page 9, lines 14-20, applicant states that one of ordinary skill in the art will recognize the high frequency combiner comprises a resistive summer (resistive combiner; page 9, lines 14 wherein a summer and combiner are analogous since the combiner of Dougherty et al combines input signals and outputs a sum of the input signals). It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the lumped sum combiner of Dougherty et al with a resistive summer in order to use any type of equivalent summing circuit capable of adding the input signals for impedance matching purposes and isolation between the input signals.

Regarding claim 13, Dougherty et al, the admitted prior art and Rizzi disclose a k-band mixer according to claim 14 wherein Dougherty et al disclose the diplexer comprises a lumped element junction (lumped element combiner 24; wherein by the dictionary definition a junction is a point of joining) wherein in the specification, page 9,

lines 14-20, applicant states that one of ordinary skill in the art will recognize the lumped element junction/combiner can be frequency selective (page 9, lines 16-20). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have the lumped element junction/combiner be frequency selective in order to combine only the desired frequencies.

Regarding claim 14, Dougherty et al, the admitted prior art and Rizzi disclose a k-band mixer according to claim 13 wherein in the specification, page 9, lines 14-20, applicant states that one of ordinary skill in the art will recognize the high frequency diplexer may comprises a distributed element frequency selective junction (a distributed element junction with frequency selectivity; page 9, lines 14-20). It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the lumped sum combiner of Dougherty et al with a distributed element frequency selective junction in order to sum N independent and distributed circuit elements at the frequency of interest to reduce noise occurring in electronic circuitry.

Regarding claim 15, Dougherty et al, the admitted prior art and Rizzi disclose a low noise block downconverter according to claim 11 wherein the admitted prior art disclose the downconverter comprises an integrated circuit chip 210, the integrated circuit chip having at least a first chip input 212, a second chip input 214 and a chip output at 260 (fig. 2; page 8, lines 8-9). It would have been obvious to one of ordinary skill in the art at the time the invention was made to integrate the downconverter into a chip circuitry in order to have a smaller size overall component device with lower current drain.

7. Claims 6-9, 16-20, and 22-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dougherty et al (US 5,465,420) in view of the admitted prior art and Rizzi (Microwave Engineering Passive Circuits, copyright 1988) and further in view of Akaishi (JP 08-250936).

Regarding claim 6, Dougherty et al, the admitted prior art, and Rizzi disclose a low noise block downconverter according to claim 5 wherein the admitted prior art discloses the integrated circuit chip 210 further comprises at least a first diode 220 and a second diode 230 (fig. 2; matched diode pair 220 & 230).

Dougherty et al, the admitted prior art, and Rizzi fail to explicitly disclose: wherein the first diode and the second diode form an anti-parallel diode pair, the anti-parallel diode pair being electrically connected to the diplexer. Akaishi discloses wherein the first diode and the second diode form an anti-parallel diode pair 23 (the anti-parallel diode pair downconverter receiving one single input which then splits into two parts to be inputted into the two matched diodes D1 and D2 configured as an anti-parallel diode pair as in the conventional anti-parallel diode downconverter of fig. 4 page 12, lines 14-15; paragraphs 2-4). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the anti-parallel diode pair of Akaishi for the downconverter within the modified low noise block downconverter of Dougherty et al, the admitted prior art, and Rizzi in order to utilize any alternative type of conventional downconverter, herein a matched diode pair configured as an anti-parallel diode pair that's capable of receiving one input from the diplexer, to downconvert to a lower frequency with the advantages of acquiring a lower noise figure

due to the even harmonic mixing and self-protection against large peak inverse voltage burnout.

Regarding claim 7, Dougherty et al, the admitted prior art, Rizzi, and Akaishi disclose a low noise block downconverter according to claim 6 wherein Akaishi further discloses the anti-parallel diode pair produces an intermediate frequency (fIF; para. 3).

Regarding claim 8, Dougherty et al, the admitted prior art, Rizzi, and Akaishi disclose a low noise block downconverter according to claim 7 wherein the admitted prior art disclose the local oscillator signal is between 9.75 GHz to 11.3 GHz (page 8, lines 20-22). It would have been obvious to one of ordinary skill in the art at the time the invention was made for Dougherty et al to have a local oscillator signal within this range in order to select a preferred local oscillator frequency range to meet the requirements for mixers used in the microwave frequency bands of Dougherty et al, i.e. the ku-band and the k-band.

Regarding claim 9, Dougherty et al, the admitted prior art, Rizzi, and Akaishi disclose a low noise block downconverter according to claim 8, wherein the admitted prior art disclose the intermediate frequency is from about 900 MHz to 2.15 GHz (page 7, lines 13-14; page 8, lines 22-24). It would have been obvious to one of ordinary skill in the art at the time the invention was made to downconvert to this IF range in order to allow the mixer of Dougherty et al to downconvert to a preferred intermediate frequency range of interest to make the receiver less susceptible to noise and allow the satellite receiver to properly tune to the proper frequency so that demodulation can take place

and electronically transmitted information can be read and extracted as suggested by the admitted prior art (page 2, lines 5-8).

Regarding claim 16, Dougherty et al, the admitted prior art, and Rizzi disclose a k-band mixer according to claim 15 wherein the admitted prior art discloses: the integrated circuit chip 210 further comprises at least a first diode 220 and a second diode 230 (fig. 2; matched diode pair 220 & 230).

Dougherty et al, the admitted prior art, and Rizzi fail to explicitly disclose: wherein the first diode and the second diode form an anti-parallel diode pair, the anti-parallel diode pair being electrically connected to the diplexer. Akaishi discloses wherein the first diode and the second diode form an anti-parallel diode pair 23 (the anti-parallel diode pair downconverter receiving one single input which then splits into two parts to be inputted into the two matched diodes D1 and D2 as in the conventional anti-parallel diode downconverter; paragraphs 2-4; fig. 4; page 12, lines 14-15). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the anti-parallel diode pair of Akaishi for the downconverter within the modified k-band mixer of Dougherty et al, the admitted prior art and Rizzi in order to utilize any alternative type of conventional downconverter, herein a matched diode pair configured as an anti-parallel diode pair which is capable of receiving one input, to downconvert to a lower frequency with the advantages of acquiring a lower noise figure due to the even harmonic mixing and self-protection against large peak inverse voltage burnout.

Regarding claim 17, Dougherty et al, the admitted prior art, Rizzi, and Akaishi disclose a k-band frequency mixer according to claim 16 wherein Dougherty et al further disclose the high frequency diplexer (lumped element combiner 24) combines the high frequency RF signal (RF signal from RF source 14 over transmission line 18 of fig. 1; col 3, lines 1-17) and the local oscillator signal (LO signal from LO source 12, see fig. 1 col 3, lines 1-17) to produce a combined high frequency signal (RF+LO at output port 26), the combined high frequency signal being provided to FET and conditioning circuits 28, 32 (col 4, lines 25-32; col 1, lines 37-42). Dougherty et al didn't disclose: the combined high frequency signal being provided to the anti-parallel diode pair. Akaishi further discloses the combined high frequency signal being provided to the anti-parallel diode pair 23 (paragraphs 2-4). It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the anti-parallel diode pair of Akaishi for the downconverter of Dougherty et al, the admitted prior art, and Rizzi to receive the combined high frequency signal in order to utilize any alternative type of typical mixers, herein the conventional anti-parallel diode pair capable of receiving the combined high frequency signal input for the purpose of acquiring a lower noise figure due to the even harmonic mixing and self-protection against large peak inverse voltage burnout.

Regarding claim 18, Dougherty et al, the admitted prior art, Rizzi, and Akaishi disclose the k-band frequency mixer according to claim 17 wherein Akaishi further discloses the anti-parallel diode pair produces an intermediate frequency fIF at 22 (fig. 4; para. 3).

Regarding claim 19, Dougherty et al, the admitted prior art, Rizzi, and Akaishi disclose the k-band frequency mixer according to claim 18, wherein the admitted prior art further discloses the local oscillator signal is from about 9.75 GHz to about 11.3 GHz (page 8, lines 20-22). It would have been obvious to one of ordinary skill in the art at the time the invention was made for Dougherty et al to have a local oscillator signal within this range in order to select a preferred local oscillator frequency range to meet the requirements for mixers used in the microwave frequency bands of Dougherty et al, i.e. the ku-band and the k-band.

Regarding claim 20, Dougherty et al, the admitted prior art, Rizzi, and Akaishi disclose the k-band mixer according to claim 19, wherein the admitted prior art further disclose the mixer produces an intermediate frequency range is from about 950 MHz to about 2.15 GHz (page 8, lines 22-24 wherein the IF range of 950 MHz to 2.15 GHz is within the 950-2.5 GHz range). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have an intermediate frequency within this frequency range in order to downconvert and reduce the microwave frequency carrier signals to a specific desired frequency range low enough and with less susceptibility to noise for reception by a satellite receiver and tuner which can then tune to the proper frequency, and in order to have compatibility with the satellite receiver equipment so that demodulation can take place and electronically transmitted information can be read and extracted as suggested by the admitted prior art (page 2, lines 5-8).

Regarding claim 22, Dougherty et al disclose a method for downconverting a radio frequency, (col 2, line 62 – col 3, line 57), the method comprising:

combining via combiner 24 (figs. 1 & 2) a local oscillator frequency (over transmission line 16 from LO source 12; col 3, lines 1-17; figs. 1-2 and hereafter) and an RF frequency (from RF source 14 over transmission line 18 at input terminal 22; col 3, lines 1-17) to produce a high frequency signal (the combined signal to be outputted to transmission line 30 representing the sum of the LO and RF signals at output port 26; col 3, lines 44-45; col 3, lines 16-18).

inputting the high frequency signal into a downconverter (32, 38) to produce an intermediate frequency (col 3, lines 41-57).

However, Dougherty et al fail to further disclose:

a k-band radio frequency; the intermediate frequency range is from about 950 MHz to 2.15 GHz; the downconverter comprising an integrated circuit chip, the integrated circuit chip containing an anti-parallel diode pair.

The admitted prior art discloses:

a ku-band downconverter 210 produces an intermediate frequency range from about 950 MHz to 2.5 GHz (page 7, lines 11-19) wherein the claimed range of 950 MHz to 2.15 GHz is within the 950 MHz. to 2.5 GHz range of the admitted prior art, and the downconverter comprises an integrated circuit chip 210. It would have been obvious to one of ordinary skill in the art at the time the invention was made to downconvert to this specific intermediate frequency range in order to allow the mixer of Dougherty et al to downconvert to a preferred intermediate frequency range of interest to make the receiver less susceptible to noise and to have compatibility with the satellite receiver equipment so that it can properly tune to the proper frequency so that demodulation can

take place and the electronically transmitted information can be read and extracted as suggested by the admitted prior art (page 2, lines 5-8).

Dougherty et al and the admitted prior art didn't specifically disclose:

a k-band radio frequency. Rizzi discloses a k-band (18-26 GHz) is contained within the microwave frequency bands (1-40Ghz) in the typical microwave frequency range (300 MHz –1000GHz). Since Dougherty et al disclose the method of downconverting is capable of downconverting a signal at microwave frequencies due to the particular downconverter type (col 1, lines 24-25), it would have been obvious to one of ordinary skill in the art at the time the invention was made to have a k-band RF signal in order to have a process of downconverting a selected frequency of interest, i.e. a specific k-band signal which will allow a tuner within a satellite receiver to demodulate the corresponding broadcast audio and video signals.

Dougherty et al, the admitted prior art and Rizzi didn't disclose:

the integrated circuit chip further containing an anti-parallel diode pair.

Akaishi discloses a downconverter within a mixer circuit in the microwave band containing an anti-parallel diode pair 23 (paragraphs 2-4; fig. 4; page 12, lines 14-15). It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the anti-parallel diode pair of Akaishi for the downconverter of Dougherty et al, the admitted prior art and Rizzi in order to utilize any alternative kind of typical mixers, herein the anti-parallel diode pair which is capable of receiving one input from the result of the diplexer, to downconvert to a lower IF frequency from a high

frequency signal with the advantage of a lower noise figure due to the even harmonic mixing and its self-protection characteristic against large peak inverse voltage burnout.

Regarding claim 23, Dougherty et al, the admitted prior art, Rizzi and Akaishi disclose a method according to claim 22 wherein the admitted prior art disclose the method further comprises the step of amplifying the intermediate frequency to a predetermined frequency via IF amplifier 140 (fig. 1; page 5, lines 13-14). It would have been obvious to one of ordinary skill in the art at the time the invention was made to amplify the IF to a predetermined frequency in order to have a device that's capable of detecting the intensity of the received IF signal and so that it can strengthen it for further receiver processing.

8. Claims 10 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dougherty et al (US 5,465,420) in view of the admitted prior art, Rizzi (Microwave Engineering Passive Circuits, copyright 1988) and Akaishi (JP 08-250936) as applied to claims 9 and 20 above respectively, and further in view of Nash et al (US 6,317,590).

Regarding claim 10, Dougherty et al, the admitted prior art, Rizzi, and Akaishi disclose the low noise block downconverter according to claim 9, wherein Dougherty et al, the admitted prior art, Rizzi, and Akaishi didn't disclose the integrated circuit chip is further configured in a sub-harmonically pumped arrangement. Nash et al disclose the mixer is configured in a sub-harmonically pumped arrangement (col 5, lines 9-11). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have a sub-harmonically pumped arrangement in the integrated circuit downconverter of Dougherty, the admitted prior art, Rizzi, and Akaishi in order to reduce

conversion loss and to avoid generating harmonic in the receiver as suggested by Nash et al (col 2, lines 25-30).

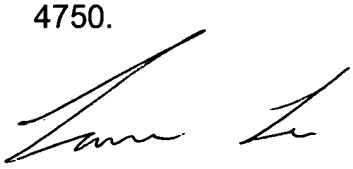
Regarding claim 21, Dougherty et al, the admitted prior art, Rizzi, and Akaishi disclose the k-band mixer according to claim 20, wherein Dougherty et al, the admitted prior art, Rizzi, and Akaishi fail to further disclose the integrated circuit chip is configured in a sub-harmonically pumped arrangement. Nash discloses the mixer is configured in a sub-harmonically pumped arrangement (col 5, lines 9-11). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have a sub-harmonically pumped arrangement in the integrated circuit downconverter of Dougherty, the admitted prior art, Rizzi, and Akaishi in order to reduce conversion loss and to avoid generating harmonic in the receiver as suggested by Nash et al (col 2, lines 25-30).

## *Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lana Le whose telephone number is (703) 308-5836. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Urban can be reached on (703) 305-4385. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9314.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-4750.



Lana Le

August 8, 2004